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Risk can be good for self-esteem: Beyond self-determination theory

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Abstract

Despite many decades of research that has highlighted all risk-taking sport activities as a means to satisfy sensation seeking needs (e.g., Zuckerman, 1979), recent research has challenged that view and has revealed that some high-risk activities provide opportunities for agentic emotion regulation during participation, and are not driven by sensation-seeking needs (e.g., Barlow, Woodman, & Hardy, 2013). Participation in high-risk sports is also associated with increased self-esteem (e.g., Aşçi, Demirhan, & Dinç, 2007). The aim of the present study was to investigate the link between the agentic and emotion regulation benefits of specific high-risk activities and any associated self-esteem benefits. We hypothesized that the emotion regulation and agency experiences in high-risk physical activities would mirror the elevated self-esteem derived from these activities. We examined high-risk activity ($n = 84$), low-risk activity ($n = 65$), and control ($n = 45$) groups and found that the experience of agentic emotion regulation was greater during participation for high-risk sport participants. High-risk sport participants also had less post-activity difficulty with emotion regulation and higher self-esteem. This study provides the first support that activities that require greater agentic emotion regulation during participation also lead to elevated self-esteem. Basic psychological needs satisfaction did not account for the differences between groups, suggesting that people have other needs (e.g., the need to self-regulate) that are not incorporated into self-determination theory.

Risk can be good for self-esteem: Beyond self-determination theory

Risk-taking as human endeavor

We live in a society that is increasingly risk-averse, and “safety” has become a sacrosanct customer services mantra. In some areas of public life (e.g., aviation, medicine), there is almost universal acceptance that this mantra is entirely appropriate. Despite, or perhaps because of, this ubiquitous safety blanket, many individuals actively seek activities that many would deem life-threatening. That is, in a risk-averse society there is a parallel thirst for danger (cf. Barlow et al., 2015).

Researchers have recently explored agentic emotion regulation theory (Barlow et al., 2013; Cazenave, Le Scanff, & Woodman, 2007; Woodman, Huggins, Le Scanff, & Cazenave, 2009; Woodman, Hardy, Barlow, & Le Scanff, 2010) to explain purposeful high-risk endeavors. Equally, engaging in high-risk activities can have a positive impact on self-esteem (Aşçi et al., 2007; Bahaeloo-Horeh & Assari, 2008; Iso-Ahola, La Verde, & Graeffe, 1989; Willig, 2008). However, there is currently no research that has examined agentic emotion regulation theory in the context of such self-esteem benefits, which is the aim of the current study.

High-risk sports

Breivik (1999) defined high-risk sports as “all sports where you have to reckon with the possibility of serious injury or death as an inherent part of the activity” (p. 10). It is noteworthy that individuals can perform such sports in environments where the objective danger is relatively minimal (e.g., Grade 1 kayaking). Nonetheless, one would consider the sport itself to be high-risk because the person who progresses in that sport will likely *progress* toward greater objective danger (e.g., Grade 3 kayaking; Barlow et al., 2015). Although authors have used a number of different descriptors of high-risk sports (e.g., *adventure sports*, *alternative sports*, *extreme sports*, *lifestyle sports* or *risk-taking sports*;

Brymer, 2011; Castanier, Le Scanff, & Woodman, 2011; Kerr & Houge Mackenzie, 2012; West & Allin, 2010), we use the term “high-risk sports” to delineate sports where one has to reckon with the possibility of severe injury or death as a consequence of something going awry. Thus, although an individual could die doing gymnastics, one does not readily consider that gymnasts have a high probability of death as an integral part of their sport. Sports that most people would consider fall into that high-risk category include: rock climbing, white-water kayaking, mountaineering, skydiving, BASE-jumping, etc.

Sensation seeking

In his theory of sensation seeking Zuckerman (1969) argued that sensation seekers feel chronically under-aroused and thus crave greater stimulation to attain their optimal level of arousal (Zuckerman, 1969, 1979, 1994). In essence, an invariant environment leads to a state of low arousal, which in turn leads sensation seekers to seek an environment that stands to increase their arousal (Zuckerman, 1994). Zuckerman subsequently defined sensation seeking as “the seeking of varied, novel, complex and intense sensations and experiences, and the willingness to take physical, social, legal and financial risks for the sake of such experiences” (1994, p. 27).

There is a large body of evidence that suggests that sensation seeking, as measured by Zuckerman and colleagues’ sensation seeking scale (Zuckerman, 1979; Zuckerman, Eysenck, & Eysenck, 1978; Zuckerman, Kolin, Price, & Zoob, 1964), does not discriminate between participants of high-risk sports, and that high-risk sport participants are a homogeneous sensation-seeking group (see Kajtna, Tusak, Baric & Burnik, 2004; Zuckerman, 1994, 2007). That is, high-risk sport participants score higher on sensation seeking compared to low-risk sport participants (Bouter, Knipschild, Feij, & Volovics, 1988; Breivik, 1991, 1996; Cronin, 1991; Gomà-i-Freixanet, 1991; Slinger & Rudestam, 1997; Rossi & Cereatti, 1993; Wagner

& Houlihan, 1994). Furthermore, Zuckerman (2007) reported that participants in expeditionary mountaineering and skydiving report the highest sensation seeking scores.

Problems with sensation seeking research on high-risk sports

Up to the end of the 20th century, sensation seeking theory and the sensation seeking scale (SSS-V; Zuckerman, 1979) were the sine qua non of research into risk-taking in high-risk sports (Ferrando & Chico, 2001; Llewellyn & Sanchez, 2008). This reliance has now been criticized by many (Arnett, 1994; Barlow et al., 2013; Bromiley & Curley, 1992; Jackson & Maraun, 1996; Roth, Hammelstein, & Brähler, 2007) because the SSS-V is incapable of discriminating between different profiles of risk takers (Barlow et al., 2013; Cooper, Agocha, & Sheldon, 2000), and perhaps more importantly incapable of determining their motives (Barlow et al., 2013; Castanier, Le Scanff, & Woodman, 2010a; Cazenave et al., 2007; Shapiro, Siegel, Scovill, & Hays, 1998).

The incapacity of sensation seeking measures to determine risk-taking motives is unsurprising. Indeed, Zuckerman (1979) developed the SSS-V as a measure of the sensation seeking trait, not as a measure of the psychology that underpins risk-taking. Specifically, the SSS-V measures individuals' *propensity* to engage in "sensation seeking behaviors" (Zuckerman, 1994, p. 5), not their motives for such behaviors. A serious problem with the SSS-V for high-risk sport application is that many of the items are explicitly about high-risk sport participation, precisely the types of behavior examined in many of the behavioral studies employing the measure (Slanger & Rudestam, 1997). For example, it is unsurprising and uninformative to report that mountaineers and skydivers might score highly on items such as "I would like to try parachute jumping" and "I often wish I could be a mountain climber." The participants under study already engage in such activities (see Barlow et al., 2013; Llewellyn & Sanchez, 2008; Roth, 2003; Slanger & Rudestam, 1997; Woodman et al., 2010).

Recent research that has addressed the aforementioned measurement shortcomings in sensation seeking has revealed that mountaineers are in fact *low* in sensation seeking (e.g., Barlow, Woodman, & Hardy, 2013; Breivik, 1996; Woodman, Hardy, Barlow, & Le Scanff, 2010). That is, although sensation seeking appears to be the underlying motive for some high-risk sports (e.g., skydiving; Barlow et al., 2013), the underlying motive for participation in other high-risk sports (e.g., mountaineering) appears rather more complex and certainly not driven by sensation seeking.

Agentic emotion regulation theory

Gross (1998) defined emotion regulation as “the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions” (p. 275). Objective danger is inherent in high-risk activities in outdoor environments, and individuals face challenging and stressful situations during participation (Barlow et al., 2015; Breivik, 1996). Individuals have to deal with, and to control, intense emotions because not doing so can have life-threatening consequences (Breivik, 1996, 2010). Specifically, according to agentic emotion regulation theory (Barlow et al., 2013; Woodman et al., 2010), high-risk activities provide individuals with an opportunity to experience, and subsequently to control, externally-derived emotions (see also Woodman, Cazenave, & Le Scanff, 2008). Engagement in high-risk activities also increases individuals’ everyday feelings of agency (Barlow, et al., 2013; Woodman et al., 2010). The risks associated with participation in high-risk activities (i.e., serious injury or death, Barlow et al., 2015; Breivik, 1999) force individuals actively to engage with their life circumstances, because a passive approach to participation can be life-threatening. Consequently, engagement in high-risk activities provides individuals with opportunities to glean a sense of agency (Barlow et al., 2013).

Agentic emotion regulation and self-esteem

Self-esteem refers to people's overall evaluation or appraisal of their worth (Rosenberg, 1965). Low self-esteem is linked to mental health disorders such as depression (Orth, Robins, & Roberts, 2008) and the engagement in high-risk behaviors such as substance abuse, suicidal tendencies, disordered eating, unprotected sex, and violent behaviors (Mann, Horsman, Schaalma & de Vries, 2004; Wild, Flisher, Bhana, & Lombard, 2004). Conversely, researchers have reported that taking part in high-risk sport positively impacts self-esteem (Aşçi et al., 2007; Bahaeloo-Horeh & Assari, 2008; Iso-Ahola et al., 1998; Willig, 2008).

Gross and Muñoz (1995) suggested that emotion regulation is essential for mental health, and Smith et al. (2000) suggested that personal agency is linked to psychological well-being. Equally, research has shown that self-esteem is related to psychological well-being (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). Fundamental and unique to high-risk activities are challenge, risk, and uncertainty (Breivik, 1996) and the concomitant experience of emotion regulation and agency during the activity (Barlow et al., 2013). The greater agentic emotion regulation experiences during high-risk sport participation can make individuals better able to regulate their emotions and to feel a sense of agency (Barlow et al., 2013), which in turn are positive indicators of well-being such as self-esteem (cf. Gross & Muñoz, 1995). However, despite a large body of evidence linking high-risk sports to both agentic emotion regulation (e.g., Barlow et al., 2013; Castanier et al., 2011; Cazenave et al., 2007; Woodman et al., 2009; Woodman et al., 2010) and self-esteem (e.g., Aşçi et al., 2007; Bahaeloo-Horeh & Assari, 2008; Iso-Ahola et al., 1998; Willig, 2008), there is to date no research that demonstrates a link between agentic emotion regulation and self-esteem in this high-risk context. Establishing such a link will allow researchers to begin to understand the mechanism by which individuals might derive self-esteem benefits in a high-risk domain.

Basic psychological need satisfaction

Self-determination theory (e.g., Deci & Ryan, 2000) postulates that individuals who feel that their basic psychological needs of autonomy, competence, and relatedness are satisfied in an activity are more likely to glean positive psychological outcomes (e.g., self-esteem) from that activity. There is much research to support that view in the physical activity domain (e.g., Amorose, Anderson-Butcher, & Cooper, 2009; Coatsworth & Conroy, 2009; Gagné, Ryan, & Bargmann, 2003; Podlog, Lochbaum, & Stevens, 2010). Also, physical activity has been shown to foster need satisfaction (Wilson, Rogers, Rodgers, & Wild, 2006) and, compared to non-exercisers, exercisers have reported greater satisfaction of their needs for autonomy, competence and relatedness (Kirkland, Karlin, Stellino, & Pulos, 2011). As such, self-determination theory can explain the self-esteem benefits that participants might derive from physical activity. However, as any form of physical activity can foster need satisfaction, self-determination theory is unlikely to discriminate high-risk activities from other forms of physical activity (e.g., low-risk sport).

Study aims

The aim of the present study was to explore whether high-risk physical activities provide greater opportunities for emotion regulation and agency (cf. Barlow et al., 2013) and whether such elevated emotion regulation and agency are accompanied by elevated self-esteem. To examine whether elevated emotion regulation and agency are unique to high-risk activities, we included a low-risk sports group as a comparison group. Low-risk sports take place in regulated and controlled environments where individuals are not required to deal with life-threatening situations (Breivik, 2010). We also included a non-exercise control group.

We hypothesized that high-risk sportspeople would report greater experience of emotion regulation and agency during participation, less post-activity difficulty with emotion regulation, less post-activity diminished agency, and greater self-esteem than both low-risk

sportspeople and non-exercise controls, who should not differ from one another. We further hypothesized that psychological need satisfaction would discriminate both exercise groups from the non-exercise group, but not from each other. In other words, contrary to agentic emotion regulation theory (Woodman et al., 2010), self-determination theory (Deci & Ryan, 1985) will not discriminate between high- and low-risk activity participants.

Method

Participants

We recruited participants from recreational activities (e.g., rock climbing, running, music) through online advertisements. We selected participants from an original broader sample of $n = 1201$ (801 men, 400 women; $M_{age} = 30.91$, $SD = 13.46$), which we used to validate the modified measures in this study (see *Preliminary Results* section). We asked participants to detail the activities that they participated in. We then used the demographic information from these participants to select participants as detailed in the categories below.

The increase in the use of online questionnaires has generated a debate over the validity and reliability of online data collection (Denscombe, 2006). In asking participants to share potentially sensitive constructs such as emotion regulation and agency, we preferred online questionnaires because they have been shown to increase self-disclosure (Stanton, 1998) and decrease social desirability, when compared to pen-and-paper measures (Joinson, 1999). Also, for large sample sizes, online questionnaires remove possible error from transcription (Mangunkusumo et al., 2005). Online data collection also has its limitations. For example, the anonymous nature of the Internet could encourage individuals to participate with a view to contaminating data from multiple responses (Kraut et al., 2004). As such, we utilized Qualtrics (2012), which allowed us to detect IP addresses and prevent potential multiple responses from a single participant (there were no such instances).

Rock climbers were defined as individuals who had participated in “traditional” lead rock climbing at least once every two weeks in the previous 12 months. Traditional rock climbing is one of the more dangerous forms of rock-climbing. In this form of rock climbing, participants climb on outdoor rock faces and they place their own anchors and protection. If they fall while leading, they fall double the length of rope that is between them and the previous protection that they have placed below them (plus any elasticity of the rope). If the protection that they have placed fails, then will fall until the next piece of protection below that holds their fall, which may or may not hold because of the dynamic load being placed on that protection, etc. Consequently, the risk of death or serious injury is considerably greater than for top-rope climbing (no dynamic falls) and lead sport climbing (no self-placed protection; fixed protection bolts are in situ in the rock). Eighty-four participants met the traditional lead rock climber criteria (70 men, 14 women; $M_{age} = 32.73$, $SD = 12.02$; $M_{years' participation} = 10.90$, $SD = 12.14$).

Low-risk sportspeople were defined as individuals who had participated in a physical activity not defined as high-risk (e.g., badminton, running) at least once every two weeks in the previous 12 months. Sports were defined as low-risk if the possibility of serious injury or death was not an inherent part of the activity (Barlow et al., 2015). Sixty-five participants met these criteria (24 men, 41 women; $M_{age} = 27.25$, $SD = 12.60$; $M_{years' participation} = 8.36$, $SD = 10.98$).

Non-exercise individuals were defined as individuals who participated in a non-exercise recreational activity (e.g., reading, photography, playing musical instruments) and who had not participated in exercise in the previous 12 months. Forty-five participants met these criteria (25 men, 20 women; $M_{age} = 24.42$, $SD = 11.75$; $M_{years' participation} = 12.29$, $SD = 9.25$).

Measures

To better reflect individuals' general feelings, we modified the tense of items from the present tense to the present perfect tense for all measures. For example, we changed the item "The emotional elements of my life are difficult to deal with" (Barlow et al., 2013) to "The emotional elements of my life have been difficult to deal with". We also modified the stem of each measure to reflect feelings in the "past two months" rather than "now". The accuracy of individuals' responses when asked to recall events in the past deteriorates as the time span increases (Tanur, 1992). We considered a two-month period short enough to reduce the potential issues regarding the accuracy of responses, and long enough to reflect individuals' general experience.

Self-esteem. The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) comprises 10 items (e.g., "On the whole, I have felt satisfied with myself") scored on a Likert scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

Basic psychological needs satisfaction. The Basic Psychological Needs Satisfaction – General (Gagné, 2003) comprises seven autonomy items (e.g., "I have felt that I was free to decide for myself how to live my life"), six competence items (e.g., "In my life I have not had much of a chance to show how capable I am"), and eight relatedness items (e.g., "I have really liked the people I have interacted with"). Items are scored on a Likert scale from 1 (*not at all true*) to 7 (*very true*).

Emotion Regulation and Agency Scale

Emotion Regulation and Agency while participating. We used the six emotion regulation items (e.g., "I have to deal with stressful situations") and the six agency items (e.g., "No one can force me to do something I don't want to do") from the *while participation* inventory of the Sensation Seeking, Emotion Regulation, and Agency Scale (SEAS; Barlow et al., 2013). Items are scored on a Likert scale from 1 (*completely disagree*) to 7 (*completely agree*).

Emotion Regulation and Agency in Everyday Life. We used the six emotion regulation items (e.g., “The emotional elements of my life have been difficult to deal with”) and the six agency items (e.g., “I have felt like people or circumstances have been trying to impose limits on me”) from the *between participation* inventory of the Sensation Seeking, Emotion Regulation, and Agency Scale (SEAS; Barlow et al., 2013). Items are scored on a Likert scale from 1 (*completely disagree*) to 7 (*completely agree*).

Procedure

Online recruitment adverts led participants to a Web page that informed them that we would treat all data in accordance with data protection and confidentiality regulations. Participants provided informed consent and demographic data before completing the study measures. The whole procedure took approximately 15 minutes. We obtained ethical approval from the institutional ethics committee.

Data analysis

We screened for spurious data and removed participants who had responded with the same value for all items on the RSES, which is partly reverse-scored. We also removed multiple responses from any same individual, which we identified through checking IP and email addresses. We conducted preliminary confirmatory factor analyses (Muthén & Muthén, 1998-2015) on the original sample pool ($n = 1201$) to assess the fit of the modified measures. We used the following criteria to assess a good fitting model: Satorra-Bentler χ^2/df ratio < 2.00 ($p > .05$) (Satorra & Bentler, 2001); the root-mean-square residual (RMSEA; Steiger, 1989) ≤ 0.06 ($p > .05$); the Comparative Fit Index (CFI; Bentler, 1990) ≥ 0.95 ; and the standardized root-mean-square residual (SRMR) ≤ 0.08 (Hu & Bentler, 1999). We removed items when the fit indices did not meet the cut-off criteria. After making modifications, we reassessed the model fit (Jöreskog, 1993).

We conducted analyses of covariance (ANCOVAs) to compare the three groups (high-risk sportspeople, low-risk sportspeople, non-exercise controls) on self-report ratings of self-esteem, sense of emotion regulation, and agency; and the experience of emotion regulation and agency while participating, controlling for age and sex. We favored univariate analyses over multivariate analyses because the dependent variables are not linear combinations of each other (Stevens, 2009). We conducted Bonferroni post-hoc tests following significant ANCOVA omnibus tests, as group sizes were unequal. We analyzed basic psychological needs satisfaction (autonomy, competence, relatedness) using multivariate analysis of covariance (MANCOVA) because they can be considered linear combinations of each other.

Results

Preliminary Analyses

Researchers have questioned the interpretability of chi-square with large samples because they are more likely to reveal significant chi-square values (Bentler & Bonett, 1980). Researchers recommend examining and reporting a range of fit indices to evaluate model fit (Hu & Bentler, 1995; Jöreskog, 1993). RMSEA, CFI, and SRMR indicated adequate fit; the inflated chi-square is likely an artifact of the large sample.

Rosenberg Self-Esteem Scale. Results revealed good fit for the seven-item model, S-B χ^2 (14) = 66.70, RMSEA = .06, CFI = .98, SRMR = .02. Standardized factor loadings were all greater than .60. Composite reliability was 0.88.

Difficulty with emotion regulation and agency. Results revealed adequate fit statistics for the ten-item two-factor model, S-B χ^2 (34) = 283.45, RMSEA = .08, CFI = .95, SRMR = .04. Standardized factor loadings were all greater than .50. Composite reliability was 0.89 for emotion regulation and 0.84 for agency.

Basic Psychological Need Satisfaction – General. The 21-item three-factor model revealed poor fit statistics, S-B χ^2 (186) = 1440.66, RMSEA = .08, CFI = .79, SRMR = .07. Researchers have suggested that measures with both negatively and positively worded items can result in items loading on separate factors (Marsh, 1996) so we subsequently tested a six-factor model by separating the autonomy (AUT), competence (COM), and relatedness (REL) scales into positively and negatively worded items, which yielded an improved fit, S-B χ^2 (174) = 899.22, RMSEA = .06, CFI = .88, SRMR = .05. It thus seems likely that the poor fit of the 21-item three-factor model was an artifact of the positively and negatively worded items rather than separate constructs per se (Roberts, Lewishon, & Seeley, 1993). As such, we retained the original three-factor model. Standardized factor loadings were all greater than .40 except for AUT Item two (.36), Item four (.28), and Item seven (.35). Composite reliabilities were 0.70 (COM), 0.70 (AUT), and 0.83 (REL).

We report the results using the full version of each measure, as there was no analytical differences between the full- and reduced-item measures.

Partial Correlations

In line with our theoretical standpoint, difficulty with emotion regulation and diminished sense of agency negatively correlated with self-esteem (see Table 1).

Univariate Between-Group Differences

ANOVA revealed a significant group difference for age and sex. Controlling for age and sex in a single ANCOVA revealed the hypothesized significant differences between the groups in the experience of emotion regulation and agency during participation, diminished agency, and self-esteem, and no significant difference for difficulty with emotion regulation. The difficulty with emotion regulation differences were significant when age and sex were entered as covariates in separate analyses (see Table 2).

Self-esteem differences controlling for emotion regulation and agency

A counter-interpretation of our theorizing would be that the group differences in self-esteem are simply an artifact of the differences in emotion regulation and agency, rather than reflecting two separable constructs. In further support of that argument, self-esteem was significantly correlated with both difficulty with emotion regulation and diminished agency (see Table 1). Two additional ANCOVAs revealed that the self-esteem differences between the groups remained significant when controlling for difficulty with emotion regulation ($F(2,190) = 4.47, p < .05$) and diminished agency ($F(2,190) = 5.83, p < .01$), as theorized.

Basic Psychological Needs Satisfaction

MANCOVA revealed a significant group difference in basic psychological needs satisfaction (see Table 2). Follow-up comparisons revealed no significant difference between the groups for autonomy or relatedness. The high-risk sport group reported significantly greater satisfaction of the need for competence than the other two groups, who did not differ from one another.

Discussion

The aim of the present study was to explore whether high-risk activities provide greater experience of emotion regulation and agency and whether engagement in the high-risk activity of traditional rock-climbing is associated with a concomitant elevated self-esteem. The results supported the hypotheses.

As theorized, difficulty with emotion regulation and diminished agency were strongly correlated with each other, and both were negatively correlated with self-esteem. Despite a good body of evidence linking high-risk sport to both agentic emotion regulation and self-esteem, these findings are the first directly to explore this relationship. High-risk sportspeople reported experiencing significantly greater emotion regulation and agency during their activity than the other two groups, as hypothesized. This greater emotion regulation and agency experience is likely due to the high-risk domain providing greater opportunities to

experience, and subsequently to control, externally derived emotions such as fear (see also Barlow et al., 2013; Woodman et al., 2010). Although not specifically tested before, research suggests that emotion regulation and agency are also important for mental health (Gross & Muñoz, 1995) and psychological well-being (Smith et al., 2000). Thus, taken together, the findings suggest that the individuals who participate in high-risk activities report higher self-esteem because they have a greater experience of agency and emotion regulation during participation. We discuss issues regarding causality in the limitations section below.

Researchers have found that some individuals who take part in high-risk sports have *greater difficulties* with emotion regulation and agency between bouts of participation (Woodman et al., 2010). Equally, Barlow et al. (2013) found that mountaineers gleaned a positive agentic emotion regulation transfer effect from the high-risk domain back into their everyday life. That is, the mountaineers experienced *better* emotion regulation *after* participating, which is aligned with the theoretical positioning and findings in the present study. Although there are clear differences between mountaineering and rock climbing (e.g., scale), there are also similarities (e.g., placing his/her own protection along the way, which can include losing one's way in dangerous terrain, the dangers of rock fall from above, the dangers of falling great distances, etc.) that make the comparisons meritorious.

In line with our hypotheses, the need for autonomy and relatedness did not discriminate between the high-risk sport and low-risk sport groups. However, counter to our hypotheses, satisfaction of the need for competence discriminated between the high-risk and the other two groups. The need for competence is defined as a desire to feel effective in interacting with the environment (Deci & Ryan, 2000; White, 1959), which is similar to the definition of agency, which may be why the two groups failed statistically to discriminate on this particular factor. Regardless, self-determination theory is clearly neither a parsimonious

nor an accurate explanation for the motives that might underlie engaging in high-risk activities.

Implications, limitations, and future research directions

The results have important potential implications for high-risk research. For example, the present study is the first to suggest that there is a link between the elevated experience of agentic emotion regulation and self-esteem. However, regarding the group differences, the cross-sectional design of the current study and the modest sample sizes are a clear limitation. Indeed, one would need repeated-measures designs to establish the theoretical causal inferences regarding elevated emotion regulation and agency in high-risk activities leading to elevated self-esteem. In defense of this cross-sectional approach, it should be noted that participation in high-risk sports such as traditional rock-climbing requires many years of skill development. As such, in order to establish causality, researchers will need to employ longitudinal research designs over many years. Such studies would also allow examination of the link between the process of agentic emotion regulation and the outcome of greater self-esteem. Equally, if conducted in a naturalistic setting, such longitudinal studies would allow researchers to establish whether individuals higher in self-esteem are more prone to choose such high-risk sports from the outset, which remains a possibility.

The previous limitations notwithstanding, if future research supports the theoretical causal pathways inferred by the present data, then this could have implications beyond high-risk sports. Indeed, difficulty with emotion regulation is also associated with behavioral problems (Eisenberg, 2000; Zeman, Cassano, Perry-Parrish, & Stegall, 2006) and dysfunctional activities such as illicit drug use (Wong et al., 2013). Also, research has shown similarities in personality traits between high-risk sport people and individuals who are opioid dependent (Franques et al., 2003). So, for example, high-risk activities that provide individuals with an opportunity to experience and subsequently manage their emotions could

help drug-dependent individuals to develop their emotion regulation strategies. As such, and because some high-risk sport activities provide individuals with the opportunity to experience a greater sense of emotion regulation, agency, and greater self-esteem (see also Barlow et al., 2013; Iso-Ahola et al., 1989), individuals engaged in socially unacceptable risk-taking activities might benefit from engaging in specific forms of high-risk sport. Clearly more research is required to elucidate any such feasibility or indeed benefit.

Conclusion

This study is the first to explore agentic emotion regulation and self-esteem in a high-risk context. The experience of emotion regulation and agency emerged as elevated during participation in the high-risk activity of traditional rock climbing. Furthermore, the experience of emotion regulation and agency appear to have a positive impact on individuals' everyday functioning and self-esteem. The processes underlying these effects are best explained via agentic emotion regulation theory and not via self-determination theory. That is, participants in high-risk sport could be distinguished from participants from low-risk sports on the basis of the agency and emotion regulation benefits that they derived from their activity, but largely not on the basis of the satisfaction of their psychological needs. The cross-sectional nature of the data as well as the modest sample sizes are clear limitations to overcome for future research. If these effects are confirmed, then the implication is that individuals who engage in high-risk sports might benefit from psychological growth, which is strikingly different to other forms of risk-taking (e.g., substance abuse). In short, risk could sometimes be good for self-esteem.

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Table 1. *Partial correlations, controlling for age and sex, between dependent variables (n = 194).*

	1.	2.	3.	4.	5.	6.	7.	8.
1. Experience of emotion regulation during activity	.84							
2. Experience of agency during activity	.40***	.74						
3. Self-esteem	.04	.16*	.91					
4. Difficulty with emotion regulation	.02	-.12	-.58***	.87				
5. Diminished sense of agency	-.02	-.14	-.55***	.69***	.83			
6. Satisfaction of the need for autonomy	.04	.23**	.63***	-.41***	-.61***	.67		
7. Satisfaction of the need for competence	.06	.18*	.67***	-.40***	-.51***	.65***	.72	
8. Satisfaction of the need for relatedness	.06	.10	.53***	-.27***	-.35***	.58***	.62***	.80

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

Standardized within groups. Coefficient alphas are on the diagonal. Difficulty with, and experience of, emotion regulation and agency from Barlow et al. (2013); Self-Esteem from Rosenberg (1965); autonomy, competence, and relatedness from Gagné (2003)

Table 2. *Adjusted means (SErr) and statistical differences between high-risk sportspeople, low-risk sportspeople, and non-exercise controls, while controlling for age and sex. Means (SD) for age and sex.*

	High-Risk (<i>n</i> = 84)	Low-Risk (<i>n</i> = 65)	Non-exercise (<i>n</i> = 45)	Omnibus between-group difference
Age	32.73 (12.01) ^a	27.25 (12.60)	26.42 (11.75)	$F_{2,191} = 5.52, p < .01, \eta^2 = 0.06$
Sex ^d	0.15 (0.36) ^a	0.63 (0.49)	0.45 (0.50)	$F_{2,191} = 21.89, p < .001, \eta^2 = 0.19$
Experience of emotion regulation	5.60 (0.14) ^a	3.93 (0.16)	3.97 (0.18)	$F_{2,189} = 36.92, p < .001, \eta^2 = 0.28$
Experience of agency	6.06 (0.10) ^a	5.37 (0.12)	4.92 (0.13)	$F_{2,189} = 19.79, p < .001, \eta^2 = 0.17$
Self-Esteem	31.11 (0.67) ^a	27.80 (0.75)	27.42 (0.86)	$F_{2,189} = 5.85, p < .01, \eta^2 = 0.06$
Difficulty with emotion regulation	3.70 (0.17)	4.19 (0.19)	4.11 (0.22)	$F_{2,189} = 1.93, p = .15, \eta^2 = 0.02^c$
Diminished sense of agency	3.07 (0.16) ^b	3.58 (0.18)	3.70 (0.21)	$F_{2,189} = 3.26, p < .05, \eta^2 = 0.03$
Basic psychological needs satisfaction				
Autonomy	4.81 (0.10)	4.76 (0.12)	4.42 (0.13)	
Competence	5.07 (0.12) ^b	4.59 (0.14)	4.48 (0.16)	$F_{6,374} = 3.14, p < .01$ Wilks' $\Lambda = .91, \eta^2 = 0.05$
Relatedness	5.37 (0.11)	5.37 (0.13)	4.94 (0.14)	

Notes. ^a Significantly different from the other two groups ^b Significantly different than the non-exercise group. ^c ANCOVA for difficulty with emotion regulation significant when age, $F_{2,190} = 3.62, p < .05$, and sex $F_{2,190} = 3.26, p < .05$, were entered as covariates in separate analyses. ^d Men = 0, Women = 1.